


AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)		RATING		PAGE OF PAGES 1 2	
2. CONTRACT (Proc. Inst. Ident.) NO. EP-C-17-031/68HERC19F0039				3. EFFECTIVE DATE See Block 20C		4. REQUISITION/PURCHASE REQUEST/PROJECT NO. PR-ORD-18-02556	
5. ISSUED BY CODE CAD		6. ADMINISTERED BY (If other than Item 5) CODE					
CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001							
7. NAME AND ADDRESS OF CONTRACTOR (No., street, country, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030				8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input checked="" type="checkbox"/> OTHER (See below)			
				9. DISCOUNT FOR PROMPT PAYMENT			
				10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN		ITEM	
CODE 198549560		FACILITY CODE					
11. SHIP TO/MARK FOR CODE CAD		12. PAYMENT WILL BE MADE BY CODE					
CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001							
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304 (c) () <input checked="" type="checkbox"/> 41 U.S.C. 3304 (a) ()				14. ACCOUNTING AND APPROPRIATION DATA See Schedule			
15A. ITEM NO	15B. SUPPLIES/SERVICES			15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
	Continued						
15G. TOTAL AMOUNT OF CONTRACT						\$150,685.00	
16. TABLE OF CONTENTS							
(X)	SEC.	DESCRIPTION	PAGE(S)	(X)	SEC.	DESCRIPTION	PAGE(S)
PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES			
	A	SOLICITATION/CONTRACT FORM			I	CONTRACT CLAUSES	
	B	SUPPLIES OR SERVICES AND PRICES/COSTS		PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.			
	C	DESCRIPTION/SPECS./WORK STATEMENT			J	LIST OF ATTACHMENTS	
	D	PACKAGING AND MARKING		PART IV - REPRESENTATIONS AND INSTRUCTIONS			
	E	INSPECTION AND ACCEPTANCE			K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
	F	DELIVERIES OR PERFORMANCE			L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
	G	CONTRACT ADMINISTRATION DATA			M	EVALUATION FACTORS FOR AWARD	
	H	SPECIAL CONTRACT REQUIREMENTS					
CONTRACTING OFFICER WILL COMPLETE ITEM 17 (SEALED-BID OR NEGOTIATED PROCUREMENT) OR 18 (SEALED-BID PROCUREMENT) AS APPLICABLE							
17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)				18. <input type="checkbox"/> SEALED-BID AWARD (Contractor is not required to sign this document.) Your bid on Solicitation Number 68HERC19R0004 , including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your bid, and (b) this award/contract. No further contractual document is necessary. (Block 18 should be checked only when awarding a sealed-bid contract.)			
19A. NAME AND TITLE OF SIGNER (Type or print)				20A. NAME OF CONTRACTING OFFICER Andrea Dehne			
19B. NAME OF CONTRACTOR		19C. DATE SIGNED		20B. UNITED STATES OF AMERICA		20C. DATE SIGNED	
BY (Signature of person authorized to sign)				BY  (Signature of the Contracting Officer)		ELECTRONIC SIGNATURE 11/27/2018	

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED EP-C-17-031/68HERC19F0039	PAGE	OF
		2	2

NAME OF OFFEROR OR CONTRACTOR

TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
0001	<p>DUNS Number: 198549560</p> <p>Firm Fixed Price Task Order EP-C-17-031 (Tetra Tech) RESES Flood and Contaminants modeling from hazardous sites.</p> <p>Delivery-Invoice Payment Schedule shall not exceed a frequency greater than once a month and 90% of the task order price. Acceptance for invoicing is based on deliverable approval by the TOCOR. For efficient processing IAW FAR clause 52.232-32, performance based payment invoicing amounts will not be submitted until the TOCOR provides deliverable approval. The TOCOR will notify Tetra Tech within 14 days of submission of a deliverable of EPAs intention to approve or disapprove.</p> <p>TOCOR: Megan Mehaffey Max Expire Date: 02/28/2020</p> <p>Delivery: 02/28/2020</p> <p>Period of Performance: 11/29/2018 to 02/28/2020</p> <p>Task Order Issuance Line Item: Technical Support for EPA/ORD/NCEA's Ecological Assessment Programs</p> <p>Accounting Info: 18-19-C-26US000-000FK8XPW-2532-26A6A-1826USE070-001 1 BFY: 18 EFY: 19 Fund: C Budget Org: 26US000 Program (PRC): 000FK8XPW Budget (BOC): 2532 Cost: 26A6A DCN - Line ID: 1826USE070-001 Funding Flag: Complete Funded: \$116,225.00</p> <p>Accounting Info: 18-19-C-26US000-000FK8XPW-2532-26A6A-1826USE070-002 2 BFY: 18 EFY: 19 Fund: C Budget Org: 26US000 Program (PRC): 000FK8XPW Budget (BOC): 2532 Cost: 26A6A DCN - Line ID: 1826USE070-002 Funding Flag: Complete Funded: \$13,775.00</p> <p>Accounting Info: 18-19-C-26US000-000FK7XR3-2532-26A6A-1826USE070-003 3 BFY: 18 EFY: 19 Fund: C Budget Org: 26US000 Program (PRC): 000FK7XR3 Budget (BOC): 2532 Cost: 26A6A DCN - Line ID: 1826USE070-003 Funding Flag: Complete Funded: \$20,685.00</p> <p>TOCOR: Megan Mehaffey/(919)541-4205/mehaffey.megan@epa.gov ALTOCOR: Sean Woznicki/(919)541-0328/woznicki.sean@epa.gov</p>				150,685.00

PERFORMANCE WORK STATEMENT
EP-C-17-031
PR-ORD-18-02556

Task Order 68HERC19F0039

Title: Flood-induced Contaminants Fate and Transport and Emergency Planning with Our States
- Interactive Mapping of Flood-Induced Contaminants from Hazardous Waste Sites in EPA Regions

EAS Short Title: RESES Flood and Contaminants

Task Order COR (TOCOR) Name: Megan Mehaffey Office: ORD/NERL/SED 109 TW Alexander Dr. (MC D243-05) RTP, NC 27711 Phone: 919-541-4205 Email: Mehaffey.Megan@epa.gov	Alternate Task Order COR (ATOCOR) Name: Sean Woznicki Office: ORD/NERL/SED 109 TW Alexander Dr. (MC D243-05) RTP, NC 27711 Phone: 919-541-0328 Email: Woznicki.Sean@epa.gov
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Period of Performance

Date of award through 16 months following award

Based period Tasks 1-5 period of performance October 15, 2018 to February 28, 2020

EPA Regional Sustainable Environmental Science Program (RESES)

Collaboration and Partnership for Sustainable and Healthy Communities

EPA's research program is a critical part of implementing the Agency's mission to protect public health and the environment. It is strategically designed to directly support our programs and regulations while also being responsive and nimble to deliver the science and technology our partners need to solve emerging, high-priority environmental and related public health needs.

The RESES program, led by EPA's Office of Research and Development (ORD), matches Agency scientific and technical expertise with high-priority, short-term research needs in each of the Agency's ten Regions across the nation. The RESES program has helped Regions respond to state, local and Tribal interests in addressing priority science issues such as waste materials management. Approaches include development of methods, use of science-based tools and multi-stakeholder engagement. RESES has also provided resources for developing innovative regional approaches that can then be used on a national scale. It has supported citizen science projects to address community concerns such as air pollution.

By design, RESES emphasizes collaboration and partnerships to deliver targeted science that can inform Agency and local decision-making. Projects are funded through an internal (EPA-only) annual solicitation for proposals.

For 2018, ORD RESES program selected the “Emergency Planning with Our States - Interactive Mapping of Flood-Induced Contaminants from Hazardous Waste Sites in EPA Regions” project to collaborate with EPA Region 2 and 3 to support EPA 2018-2022 Strategic Goals (see <https://www.epa.gov/sites/production/files/2018-02/documents/fy-2018-2022-epa-strategic-plan.pdf>) Specifically, this project results can be used to support superfund site remediation and flood-induced emergency preparedness and planning for the States.

Background

Extreme flooding has the potential to induce transport of toxic materials that are stored in the environment. In EPA Region 3, Lower Darby Creek Area (LDCA) Superfund site is vulnerable to flooding. The LDCA Site includes two landfills: (1) the Clearview Landfill and (2) the Folcroft Landfill and Annex. Operable Unit (OU) 1 includes Clearview Landfill, the Eastwick Regional Park (a/k/a “City Park” or “Park”), and a portion of the Eastwick neighborhood (a residential area) located generally east of the present-day landfill area and the Park (https://response.epa.gov/site/site_profile.aspx?site_id=5864.) OU2 consists of Folcroft Landfill and Folcroft Annex. Tidal influence affects the lower portion of Darby Creek and upstream as far as the landfill. Tidal influence generally affects Darby Creek up to the confluence of Darby and Cobb Creeks near the northern portion of the Clearview landfill, but the extent of tidal influence changes depending on extreme weather conditions. Flood plains encroach significantly onto the study area. Hurricane Floyd in 1999 caused significant flooding of Cobbs and Darby Creeks into the Eastwick neighborhood and surrounding area, inundating many homes.

These hazardous waste sites in or near floodplains could become inundated, releasing chemicals and other contaminants into flood waters or transporting contaminated sediments. However, the potential fate-and-transport of contaminants, particularly in soil/sediment, during a flood event is often poorly understood at these sites.

Purpose of this Task Order (TO)

The purpose of this TO is to provide support to EPA for producing scenario information of flood-induced temporal and spatial distributions of contaminants in sediments and surface water from the hazardous waste sites. Two study locations are included in this TO, and they are Lower Darby Creek Area Clearview landfill Operable Unit 1 and Folcroft landfill Operable Unit 2. Tetra Tech has conducted flood studies for Superfund and hazardous sites remedial planning using HEC-RAS model. EPA selects HEC-RAS for this task order with maximizing the use of federal funding results in mind and Tetra Tech shall use the data where appropriate. EPA selects Water quality Analysis Simulation Program (WASP) model for this task order as WASP was used to deliver impacts of Gold King Mine waste release into the Animas River. Model outputs should be mapped in the form of ESRI Story Maps to display contaminant concentrations and transport across floods of varying magnitude. This TO products should prepare States’ disaster planners and responders for multiple flood return periods (10, 50, 100 and 500-year flood), and provide information for EPA superfund program managers.

The TO product should equip stakeholders and decisionmakers to preemptively address contaminants vulnerabilities, build resiliency, prepare for decontaminations, and mitigate potential human health impacts, as well as, environmental protection and restoration of priority areas. Pursuant to FAR 52.227-17, Rights in Data—Special Works, EPA shall have unlimited rights in all data, as that term is defined in the referenced clause, delivered to EPA under this task order, and in all data first produced in performance of this task order. This includes technical data, task design computer software, computer software documentation, and computer databases or other databases as those terms are defined in FAR 2.101.

Travel

Travel may be required for one person to the study locations during this work performance period. The contractor shall work with TOCOR to determine the travel purpose and expected outcomes for approval.

Tasks

Task 1: Communications and Administration

The contractor shall provide management and administrative support for the project throughout its duration. The contractor shall participate in calls with the U. S. EPA TOCOR to discuss points of contact, roles and responsibilities, Quality Assurance Project Plan (QAPP) protocols, timelines, the schedule of benchmarks, milestones and deliverables, establish dates and times for monthly calls and monthly technical progress reports and general task order administrative and technical information.

Task 2: Quality Assurance Project Plan

All work conducted under this task order shall be performed pursuant to an EPA-approved Quality Assurance Project Plan (QAPP) and its required information can be provided by EPA upon request. The QAPP shall be submitted for review and approval by the TOCOR and the EPA QA Officer (14) days after TO award. The QAPP shall be in conformance with EPA's Requirements for Quality Assurance Project Plans (EPA QA/R-5). Portions of this TO relevant to modeling will reference Guidance for Quality Assurance Project Plans for Modeling (EPA QA/G-5M), while portions of this TO relevant to geospatial data will reference Guidance for Quality Assurance Project Plans for Geospatial Data (EPA QA/G-5G). Elements from these sources will be used to derive base phase QAPPs for this TO.

Draft QAPP submitted to the TOCOR for review (14) days after TO award as a Microsoft Document or Adobe Portable Document Format.

Final QAPP addressing TOCOR's and QA officer's comments on the QAPP due to EPA (5) business days after receiving comments as a Microsoft Document or Adobe Portable Document Format.

Contractor shall not begin work on Tasks until receiving in writing from the EPA TOCOR that EPA has approved the QAPP.

Task 3: Hydraulic Modeling for Flood Inundation – HEC-RAS 2D Model

The contractor shall utilize EPA contracted data and information (e.g., EPA Work Assignment No. 061-RDRD-D366 of Contract No. EP-S3-07-04) and other available data to configure a

HEC-RAS 2D unsteady flow model and to simulate flood inundation in the study locations across multiple flood return periods (i.e., 10, 50, 100 and 500-year flood) using design storms. The study locations are Lower Darby Creek Area OU1 and OU2 sites. First, the contractor shall work with TOCOR to compile a final list of data sources and inputs for setting up the HEC-RAS 2-D unsteady flow model. The contractor shall deliver the final list of data sources and configuration of the HEC-RAS 2D model (2) months after final approval of QAPP. The contractor shall incorporate TOCOR comments on data sources and configuration and calibrate the model by comparing model output with observations. The contractor shall work with TOCOR to document model calibration and validation results in a Microsoft Word format. The contractor shall deliver the final model calibration results (2) months after completing final data sources and model configuration. The contractor shall run the HEC-RAS 2D model to produce time series flood inundation and water surface elevation over the flooding period. The draft model outputs shall be documented in a Microsoft Word format and delivered to TOCOR for review (2) months after the final model calibration and validation. The contractor shall work with TOCOR to deliver the final time-stepped flood inundation extents and water surface (8) months after the TO award. The final HEC-RAS 2D model results should be documented in high quality scripts, tables and figures.

Task 4: Sedimentation and Water Quality Modeling for Flood-induced Contaminants Fate and Transport – WASP Model or best suited model for flood-induced contaminants fate and transport in sediments (Best Model here onward)

The contractor shall use the HEC-RAS 2D hydrodynamic outputs from Task 3 to configure the WASP model (model 8.2 with TOXI module) or Best Model for flood-induced contaminants fate and transport from the study locations, Lower Darby Creek Area OU1 and OU2 sites. The decision on WASP or Best Model with rationale shall be included in the QAPP. The priority contaminants for this study are PFOA, PAH (particularly Benzo[a]pyrene (B[a]P)), lead, arsenic, chromium, and dioxin. First, the contractor shall work with TOCOR to develop a final list of data sources in a table format and to set up the WASP model or Best Model. The final list of data sources and configuration of the model shall be delivered to TOCOR (9) months after the TO award. The contractor shall use the final data sources and model configuration to calibrate the WASP model or Best Model. The contractor shall work with TOCOR to deliver the final model calibration results in Microsoft Word format to TOCOR (2) months after the completion of final data sources and model configuration. The contractor shall run the WASP model or Best Model to produce time series fate and transport of contaminant concentrations in sediments and water for the above flood return periods and over the flooding period. The draft WASP model or Best Model results shall be documented with figures and tables in Microsoft Word format, and shall be delivered to TOCOR (2) months after final calibration of the model. The contractor shall work with TOCOR to deliver the final WASP or Best Model time-stepped spatial distributions of PFOA, PAH (particularly Benzo[a]pyrene (B[a]P)), lead, PCB (aroclor-1260) and total PCB, chromium, DDX, and dioxin concentrations in sediments and water with multiple flood return periods for LDCA OU1 and OU2 sites (14) months after the TO award.

Task 5: ESRI Story Map

The contractor shall use the outputs from Task 4 to develop an interactive ESRI Story Map that is compatible with EPA GeoPlatform environment. The map should include the HEC-RAS and WASP model outputs or Best Model outputs showing flood inundations and contaminants concentrations for 10, 50, 100 and 500-year flood return periods. The map should allow users to

have the options to select any combination of individual contaminant and flood return period. The contractor shall recommend functionality design and best practices to maximize performance. The contractor shall provide a design framework diagramming the user interface for the interactive Story Map. The contractor shall work with TOCOR to determine which, if any, socioeconomic indicators can be incorporated into the Story Map. The contractor shall work with TOCOR to design the Story Map user interface to align with existing tools currently in EnviroAtlas. The design framework shall be submitted in PowerPoint or similar format. The contractor shall work with TOCOR to deliver the final design of the Story Map (8) months after TO award.

The contractor shall present a demo and deliver a draft working prototype of the Story Map to TOCOR (7) months after the Final design framework. The contractor shall deliver data and its associated Story Map that are compatible to EPA GeoPlatform environment to TOCOR for final approval (1) month after the approval of the draft working prototype.

Finalized prototype Story Map, data and documentation used to create the Story Map incorporating TOCOR's comments on the prototype shall be delivered on an external drive and uploaded into EPA EnviroAtlas for testing. Final data, documentations, and the Story Map are due to EPA by February 28, 2020.

Deliverables and Schedule

Task No.	Deliverable	Schedule
BASE YEAR		
1	Progress Reports Other Communication	Due Monthly Due upon request by the TOCOR
2	Draft QAPP	Due 14 business days after award of Task Order
2	Final QAPP	Due 5 business days of receipt of the written comments on the draft QAPP
3	Final list of data sources and configuration of the HEC-RAS 2D model	Due 2 months after final approval of the QAPP
3	Final HEC-RAS 2D model calibration results	Due 2 months after Final data sources and model configuration
3	Draft HEC-RAS 2D model outputs	Due 2 months after Final model calibration and validation
3	Final HEC-RAS 2D time-stepped flood inundation extents and water surface	Due 8 months after TO award

4	Final list of data sources and configuration of the WASP or Best model	Due 9 months after TO award
4	Final WASP or Best model calibration results	Due 2 months after Final data sources and WASP or Best model configuration
4	Draft WASP or Best model results	Due 2 months after final calibration of WASP or Best model
4	Final WASP or Best model time-stepped spatial distributions of PAH (particularly Benzo[a]pyrene (B[a]P), lead, arsenic, chromium, PCB, dioxin concentrations in sediments and water with multiple flood return periods	Due 14 months after TO award
5	Final design framework of the Story Map	Due 8 months after TO award
5	Draft and present working prototype of the Story Map	Due 7 months after the Final design framework
5	Final data and its associated Story Map	Due 1 month after the approval of the Draft working prototype
5	Final data, documentations, and the Story Map	Due by February 28, 2020

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE		PAGE OF PAGES	
				1	2
2. AMENDMENT/MODIFICATION NO. P00001		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO.	
6. ISSUED BY CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001		CODE CAD		5. PROJECT NO. (If applicable)	
		7. ADMINISTERED BY (If other than Item 6)		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030		(x)		9A. AMENDMENT OF SOLICITATION NO.	
				9B. DATED (SEE ITEM 11)	
		x		10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 68HERC19F0039	
CODE 198549560		FACILITY CODE		10B. DATED (SEE ITEM 13) 11/27/2018	
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS					
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. ACCOUNTING AND APPROPRIATION DATA (If required) See Schedule					
Net Decrease: -\$130,000.00					
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.					
CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.				
X	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).				
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:				
	D. OTHER (Specify type of modification and authority)				
E. IMPORTANT: Contractor <input checked="" type="checkbox"/> is not <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.					
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)					
DUNS Number: 198549560					
TOCOR: Megan Mehaffey Max Expire Date: 02/28/2020					
LIST OF CHANGES:					
Reason for Modification: Other Administrative Action to Correct Internal Duplicate Line of Accounting. Second modification immediately following to consolidate lines, IAW with EAS helpdesk process.					
Administrative De-Obligation Amount for this Modification: -\$130,000.00					
CHANGES FOR ACCOUNTING CODE:					
18-19-C-26US000-000FK8XPW-2532-26A6A-1826USE070-001					
Amount changed from \$116,225.00 to \$0.00					
Continued ...					
Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.					
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
			Andrea Dehne		
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA	
(Signature of person authorized to sign)				(Signature of Contracting Officer)	
				16C. DATE SIGNED	

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
EP-C-17-031/68HERC19F0039/P00001PAGE OF
2 2NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>CHANGES FOR ACCOUNTING CODE: 18-19-C-26US000-000FK8XPW-2532-26A6A-1826USE070-002 Amount changed from \$13,775.00 to \$0.00</p> <p>Delivery: 02/28/2020 Delivery Location Code: CAD CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001 USA</p> <p>Payment: Period of Performance: 11/29/2018 to 02/28/2020 TOCOR: Megan Mehaffey/ (919) 541-4205/mehaffey.megan@epa.gov ALTOCOR: Sean Woznicki/ (919) 541-0328/woznicki.sean@epa.gov</p>				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE		PAGE OF PAGES	
						1 2	
2. AMENDMENT/MODIFICATION NO.		3. EFFECTIVE DATE		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
P000002		See Block 16C		PR-ORD-18-02556			
6. ISSUED BY		CODE		7. ADMINISTERED BY (If other than Item 6)		CODE	
CAD							
CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001							
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)				(x)			
TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030							
				9A. AMENDMENT OF SOLICITATION NO.			
				9B. DATED (SEE ITEM 11)			
				x			
				10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 68HERC19F0039			
				10B. DATED (SEE ITEM 13) 11/27/2018			
CODE 198549560		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)				Net Increase:		\$130,000.00	
See Schedule							
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.						
X	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).						
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:						
	D. OTHER (Specify type of modification and authority)						
E. IMPORTANT: Contractor <input checked="" type="checkbox"/> is not <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)							
DUNS Number: 198549560							
TOCOR: Megan Mehaffey Max Expire Date: 02/28/2020							
LIST OF CHANGES:							
Reason for Modification: Other Administrative Action to Finalize Internal Duplicate Line of Accounting Correction.							
New Total Obligated Amount for this Award: \$150,685.00							
CHANGES FOR FUNDING LINE ITEM NUMBER: 1							
NEW COMBINED ACCOUNTING CODE ADDED:							
Account code:							
Continued ...							
Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				Andrea Dehne			
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
(Signature of person authorized to sign)				(Signature of Contracting Officer)			

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/68HERC19F0039/P00002	2	2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>18-19-C-26US000-000FK8XPW-2532-26A6A-1826USE070-001</p> <p>Beginning FiscalYear 18 Ending Fiscal Year 19 Fund (Appropriation) C Budget Organization 26US000 Program (PRC) 000FK8XPW Budget (BOC) 2532 Job # (Site/Project) Cost Organization 26A6A DCN-LineID 1826USE070-001 Amount: \$130,000.00 Subject To Funding: N</p> <p>CHANGES FOR FUNDING LINE ITEM NUMBER: 3 Accounting Info from Base Award remaining for corrected system obligation: 18-19-C-26US000-000FK7XR3-2532-26A6A-1826USE070-003 3 BFY: 18 EFY: 19 Fund: C Budget Org: 26US000 Program (PRC): 000FK7XR3 Budget (BOC): 2532 Cost: 26A6A DCN - Line ID: 1826USE070-003 Funding Flag: Complete Funded: \$20,685.00</p> <p>Fully funded and system corrected FFP Task Order with a total obligated amount of \$150,685.00 Delivery: 02/28/2020 Delivery Location Code: CAD CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001 USA</p> <p>Payment: Period of Performance: 11/29/2018 to 02/28/2020 TOCOR: Megan Mehaffey/ (919) 541-4205/mehaffey.megan@epa.gov ALTOCOR: Sean Woznicki/ (919) 541-0328/woznicki.sean@epa.gov</p>				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE		PAGE OF PAGES 1 2				
2. AMENDMENT/MODIFICATION NO. P00003		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO. See Schedule		5. PROJECT NO. (If applicable)			
6. ISSUED BY CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001		CODE CAD		7. ADMINISTERED BY (If other than Item 6)		CODE			
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030				(X)			9A. AMENDMENT OF SOLICITATION NO.		
							9B. DATED (SEE ITEM 11)		
				X			10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 68HERC19F0039		
							10B. DATED (SEE ITEM 13) 11/27/2018		
CODE 198549560		FACILITY CODE							
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS									
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.									
12. ACCOUNTING AND APPROPRIATION DATA (If required) See Schedule				Net Increase:		\$12,000.00			
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.									
CHECK ONE		A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
		B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).							
X		C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Additional Work within Scope; No Extension to the Period of Performance							
		D. OTHER (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not <input checked="" type="checkbox"/> is required to sign this document and return <u>1</u> copies to the issuing office.									
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) DUNS Number: 198549560 TOCOR: Megan Mehaffey Max Expire Date: 02/28/2020 LIST OF CHANGES: Reason for Modification: Supplemental Agreement for Work Within Scope; No Extension to the Period of Performance (see attached PWS amendment) Total Amount for this Modification: \$12,000.00 New Total Amount for this Version: \$162,685.00 New Total Amount for this Award: \$162,685.00 Obligated Amount for this Modification: \$12,000.00 New Total Obligated Amount for this Award: \$162,685.00 Continued ...									
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Andrea Dehne					
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA  (Signature of Contracting Officer)		16C. DATE SIGNED 08/06/2019			
(Signature of person authorized to sign)									

Previous edition unusable

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/68HERC19F0039/P00003	2	2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>Alternate COR/Project Officer changed to : Patrice Borsz</p> <p>CHANGES FOR LINE ITEM NUMBER: 1 Total Amount changed from \$150,685.00 to \$162,685.00 Obligated Amount for this Modification: \$12,000.00</p> <p>CHANGES FOR DELIVERY LOCATION: CAD Amount changed from \$150,685.00 to \$162,685.00</p> <p>NEW ACCOUNTING CODE ADDED: Account code: 19-20-C-26US000-000FK8XPV-2532-26A6A-1926USE045-001 1 Beginning FiscalYear 19 Ending Fiscal Year 20 Fund (Appropriation) C Budget Organization 26US000 Program (PRC) 000FK8XPV Budget (BOC) 2532 Job # (Site/Project) Cost Organization 26A6A DCN-LineID 1926USE045-001 Amount: \$12,000.00 Subject To Funding: N</p> <p>Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711 Period of Performance: 11/29/2018 to 02/28/2020 TOCOR: Megan Mehaffey/(919)541-4205/mehaffey.megan@epa.gov ALTOCOR: Patrice Borsz/(919)541-5233/borsz.patrice@epa.gov</p>				

**PERFORMANCE WORK STATEMENT
EP-C-17-031
PR-ORD-19-01470**

Task Order TO 19F0039

Amendment #1

Amended 6/12/2019

Title: Flood-induced Contaminants Fate and Transport and Emergency Planning with Our States
- Interactive Mapping of Flood-Induced Contaminants from Hazardous Waste Sites in EPA
Regions

This amendment #1 is to: Revise Task 4 description (within scope; no extension of PoP)

EAS Short Title: RESES Flood and Contaminants

Task Order COR (TOCOR) Name: Megan Mehaffey Office: ORD/NERL/SED 109 TW Alexander Dr. (MC D243-05) RTP, NC 27711 Phone: 919-541-4205 Email: Mehaffey.Megan@epa.gov	Alternate Task Order COR (ATOCOR) Name: Patrice Borsz Office: ORD/NERL/SED 4930 Old Page Road (MC E211L) RTP, NC 27703 Phone: 919-541-5233 Email: Borsz.Patrice@epa.gov
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Period of Performance

Date of award through 16 months following award

Based period Tasks 1-5 period of performance October 15, 2018 to February 28, 2020

EPA Regional Sustainable Environmental Science Program (RESES)

Collaboration and Partnership for Sustainable and Healthy Communities

EPA's research program is a critical part of implementing the Agency's mission to protect public health and the environment. It is strategically designed to directly support our programs and regulations while also being responsive and nimble to deliver the science and technology our partners need to solve emerging, high-priority environmental and related public health needs.

The RESES program, led by EPA's Office of Research and Development (ORD), matches Agency scientific and technical expertise with high-priority, short-term research needs in each of the Agency's ten Regions across the nation. The RESES program has helped Regions respond to state, local and Tribal interests in addressing priority science issues such as waste materials management. Approaches include development of methods, use of science-based tools and multi-stakeholder engagement. RESES has also provided resources for developing innovative

regional approaches that can then be used on a national scale. It has supported citizen science projects to address community concerns such as air pollution.

By design, RESES emphasizes collaboration and partnerships to deliver targeted science that can inform Agency and local decision-making. Projects are funded through an internal (EPA-only) annual solicitation for proposals.

For 2018, ORD RESES program selected the “Emergency Planning with Our States - Interactive Mapping of Flood-Induced Contaminants from Hazardous Waste Sites in EPA Regions” project to collaborate with EPA Region 2 and 3 to support EPA 2018-2022 Strategic Goals (see <https://www.epa.gov/sites/production/files/2018-02/documents/fy-2018-2022-epa-strategic-plan.pdf>) Specifically, this project results can be used to support superfund site remediation and flood-induced emergency preparedness and planning for the States.

Background

Extreme flooding has the potential to induce transport of toxic materials that are stored in the environment. In EPA Region 3, Lower Darby Creek Area (LDCA) Superfund site is vulnerable to flooding. The LDCA Site includes two landfills: (1) the Clearview Landfill and (2) the Folcroft Landfill and Annex. Operable Unit (OU) 1 includes Clearview Landfill, the Eastwick Regional Park (a/k/a “City Park” or “Park”), and a portion of the Eastwick neighborhood (a residential area) located generally east of the present-day landfill area and the Park (https://response.epa.gov/site/site_profile.aspx?site_id=5864.) OU2 consists of Folcroft Landfill and Folcroft Annex. Tidal influence affects the lower portion of Darby Creek and upstream as far as the landfill. Tidal influence generally affects Darby Creek up to the confluence of Darby and Cobb Creeks near the northern portion of the Clearview landfill, but the extent of tidal influence changes depending on extreme weather conditions. Flood plains encroach significantly onto the study area. Hurricane Floyd in 1999 caused significant flooding of Cobbs and Darby Creeks into the Eastwick neighborhood and surrounding area, inundating many homes.

These hazardous waste sites in or near floodplains could become inundated, releasing chemicals and other contaminants into flood waters or transporting contaminated sediments. However, the potential fate-and-transport of contaminants, particularly in soil/sediment, during a flood event is often poorly understood at these sites.

Purpose of this Task Order (TO)

The purpose of this TO is to provide support to EPA for producing scenario information of flood-induced temporal and spatial distributions of contaminants in sediments and surface water from the hazardous waste sites. Two study locations are included in this TO, and they are Lower Darby Creek Area Clearview landfill Operable Unit 1 and Folcroft landfill Operable Unit 2. Tetra Tech has conducted flood studies for Superfund and hazardous sites remedial planning using HEC-RAS model. EPA selects HEC-RAS for this task order with maximizing the use of federal funding results in mind and Tetra Tech shall use the data where appropriate. EPA selects Water quality Analysis Simulation Program (WASP) model for this task order as WASP was used to deliver impacts of Gold King Mine waste release into the Animas River. Model outputs should be mapped in the form of ESRI Story Maps to display contaminant concentrations and transport across floods of varying magnitude. This TO products should prepare States’ disaster

planners and responders for multiple flood return periods (10, 50, 100 and 500-year flood), and provide information for EPA superfund program managers.

The TO product should equip stakeholders and decisionmakers to preemptively address contaminants vulnerabilities, build resiliency, prepare for decontaminations, and mitigate potential human health impacts, as well as, environmental protection and restoration of priority areas. Pursuant to FAR 52.227-17, Rights in Data—Special Works, EPA shall have unlimited rights in all data, as that term is defined in the referenced clause, delivered to EPA under this task order, and in all data first produced in performance of this task order. This includes technical data, task design computer software, computer software documentation, and computer databases or other databases as those terms are defined in FAR 2.101.

Travel

Travel may be required for one person to the study locations during this work performance period. The contractor shall work with TOCOR to determine the travel purpose and expected outcomes for approval.

Tasks

Task 1: Communications and Administration

The contractor shall provide management and administrative support for the project throughout its duration. The contractor shall participate in calls with the U. S. EPA TOCOR to discuss points of contact, roles and responsibilities, Quality Assurance Project Plan (QAPP) protocols, timelines, the schedule of benchmarks, milestones and deliverables, establish dates and times for monthly calls and monthly technical progress reports and general task order administrative and technical information.

Task 2: Quality Assurance Project Plan

All work conducted under this task order shall be performed pursuant to an EPA-approved Quality Assurance Project Plan (QAPP) and its required information can be provided by EPA upon request. The QAPP shall be submitted for review and approval by the TOCOR and the EPA QA Officer (14) days after TO award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this TO relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this TO relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive base phase QAPPs for this TO.

Draft QAPP submitted to the TOCOR for review (14) days after TO award as a Microsoft Document or Adobe Portable Document Format.

Final QAPP addressing TOCOR's and QA officer's comments on the QAPP due to EPA (5) business days after receiving comments as a Microsoft Document or Adobe Portable Document Format.

Contractor shall not begin work on Tasks until receiving in writing from the EPA TOCOR that EPA has approved the QAPP.

Task 3: Hydraulic Modeling for Flood Inundation – HEC-RAS 2D Model

The contractor shall utilize EPA contracted data and information (e.g., EPA Work Assignment No. 061-RDRD-D366 of Contract No. EP-S3-07-04) and other available data to configure a HEC-RAS 2D unsteady flow model and to simulate flood inundation in the study locations across multiple flood return periods (i.e., 10, 50, 100 and 500-year flood) using design storms. The study locations are Lower Darby Creek Area OU1 and OU2 sites. First, the contractor shall work with TOCOR to compile a final list of data sources and inputs for setting up the HEC-RAS 2-D unsteady flow model. The contractor shall deliver the final list of data sources and configuration of the HEC-RAS 2D model (2) months after final approval of QAPP. The contractor shall incorporate TOCOR comments on data sources and configuration and calibrate the model by comparing model output with observations. The contractor shall work with TOCOR to document model calibration and validation results in a Microsoft Word format. The contractor shall deliver the final model calibration results (2) months after completing final data sources and model configuration. The contractor shall run the HEC-RAS 2D model to produce time series flood inundation and water surface elevation over the flooding period. The draft model outputs shall be documented in a Microsoft Word format and delivered to TOCOR for review (2) months after the final model calibration and validation. The contractor shall work with TOCOR to deliver the final time-stepped flood inundation extents and water surface (8) months after the TO award. The final HEC-RAS 2D model results should be documented in high quality scripts, tables and figures.

Task 4: Sedimentation and Water Quality Modeling for Flood-induced Contaminants Fate and Transport – WASP Model or best suited model for flood-induced contaminants fate and transport in sediments (Best Model here onward)

The contractor shall use the HEC-RAS 2D hydrodynamic outputs from Task 3 to configure the WASP model (model 8.2 with TOXI module) or Best Model for flood-induced contaminants fate and transport from the study locations, Lower Darby Creek Area OU1 and OU2 sites. The decision on WASP or Best Model with rationale shall be included in the QAPP. The priority contaminants for this study are PFOA, PAH (particularly Benzo[a]pyrene (B[a]P)), lead, arsenic, chromium, and dioxin. First, the contractor shall work with TOCOR to develop a final list of data sources in a table format and to set up the WASP model or Best Model. The final list of data sources and configuration of the model shall be delivered to TOCOR (9) months after the TO award. The contractor shall use the final data sources and model configuration to calibrate the WASP model or Best Model. The contractor shall work with TOCOR to deliver the final model calibration results in Microsoft Word format to TOCOR (2) months after the completion of final data sources and model configuration. The contractor shall run the WASP model or Best Model to produce time series fate and transport of contaminant concentrations in sediments and water for the above flood return periods and over the flooding period. The draft WASP model or Best Model results shall be documented with figures and tables in Microsoft Word format, and shall be delivered to TOCOR (2) months after final calibration of the model. The contractor shall work with TOCOR to deliver the final WASP or Best Model time-stepped spatial distributions of PFOA, PAH (particularly Benzo[a]pyrene (B[a]P)), lead, PCB (aroclor-1260) and total PCB, chromium, DDX, and dioxin concentrations in sediments and water with multiple flood return periods for LDCA OU1 and OU2 sites (14) months after the TO award.

Study site specific contaminants in sediment and soil data has been newly shared by the site responsible parties. Citizen science geospatial neighborhood scale data for Hurricane Irene and Floyd flooded areas and flood water depth is newly discovered for hydrodynamic model calibration and analysis. These new data **expand** on the original and are critical to further evaluate HEC-RAS and WASP model output and assess the uncertainty of model performance. As WASP will use HEC-RAS model output as an input to simulate contaminants fate and transport for Clearview, Folcroft and surrounding neighborhoods, the accuracy of the HEC-RAS model output substantively affects the WASP results. Hence the new information is **essential** to evaluate the sensitivity and validity of HEC-RAS WASP coupled modeling effort. The contractor shall incorporate the new data into the sensitivity analyses to quantify uncertainty in model predictions of priority pollutants and sediment transport.

Task 5: ESRI Story Map

The contractor shall use the outputs from Task 4 to develop an interactive ESRI Story Map that is compatible with EPA GeoPlatform environment. The map should include the HEC-RAS and WASP model outputs or Best Model outputs showing flood inundations and contaminants concentrations for 10, 50, 100 and 500-year flood return periods. The map should allow users to have the options to select any combination of individual contaminant and flood return period. The contractor shall recommend functionality design and best practices to maximize performance. The contractor shall provide a design framework diagramming the user interface for the interactive Story Map. The contractor shall work with TOCOR to determine which, if any, socioeconomic indicators can be incorporated into the Story Map. The contractor shall work with TOCOR to design the Story Map user interface to align with existing tools currently in EnviroAtlas. The design framework shall be submitted in PowerPoint or similar format. The contractor shall work with TOCOR to deliver the final design of the Story Map (8) months after TO award.

The contractor shall present a demo and deliver a draft working prototype of the Story Map to TOCOR (7) months after the Final design framework. The contractor shall deliver data and its associated Story Map that are compatible to EPA GeoPlatform environment to TOCOR for final approval (1) month after the approval of the draft working prototype.

Finalized prototype Story Map, data and documentation used to create the Story Map incorporating TOCOR's comments on the prototype shall be delivered on an external drive and uploaded into EPA EnviroAtlas for testing. Final data, documentations, and the Story Map are due to EPA by February 28, 2020.

Deliverables and Schedule

Task No.	Deliverable	Schedule
BASE YEAR		
1	Progress Reports Other Communication	Due Monthly Due upon request by the TOCOR
2	Draft QAPP	Due 14 business days after award of Task Order

2	Final QAPP	Due 5 business days of receipt of the written comments on the draft QAPP
3	Final list of data sources and configuration of the HEC-RAS 2D model	Due 2 months after final approval of the QAPP
3	Final HEC-RAS 2D model calibration results	Due 2 months after Final data sources and model configuration
3	Draft HEC-RAS 2D model outputs	Due 2 months after Final model calibration and validation
3	Final HEC-RAS 2D time-stepped flood inundation extents and water surface	Due 8 months after TO award
4	Final list of data sources and configuration of the WASP or Best model	Due 9 months after TO award
4	Final WASP or Best model calibration results including sensitivity analysis to quantify uncertainty in model predictions	Due 2 months after Final data sources and WASP or Best model configuration
4	Draft WASP or Best model results	Due 2 months after final calibration of WASP or Best model
4	Final WASP or Best model time-stepped spatial distributions of PAH (particularly Benzo[a]pyrene (B[a]P), lead, arsenic, chromium, PCB, dioxin concentrations in sediments and water with multiple flood return periods	Due 14 months after TO award
5	Final design framework of the Story Map	Due 8 months after TO award
5	Draft and present working prototype of the Story Map	Due 7 months after the Final design framework
5	Final data and its associated Story Map	Due 1 month after the approval of the Draft working prototype
5	Final data, documentations, and the Story Map	Due by February 28, 2020

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE		PAGE OF PAGES 1 2		
2. AMENDMENT/MODIFICATION NO. P00004		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO. PR-ORD-20-00431		5. PROJECT NO. (If applicable)	
6. ISSUED BY CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001		CODE CAD		7. ADMINISTERED BY (If other than Item 6)		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030 CODE 198549560 FACILITY CODE				(x) 9A. AMENDMENT OF SOLICITATION NO.			
							9B. DATED (SEE ITEM 11)
				x 10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 68HERC19F0039			
				10B. DATED (SEE ITEM 13) 11/27/2018			
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required) See Schedule							
13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.						
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).						
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:						
X	D. OTHER (Specify type of modification and authority) Mutual Agreement - WORK WITHIN SCOPE; NO COST POP EXTENSION						
E. IMPORTANT: Contractor <input type="checkbox"/> is not <input checked="" type="checkbox"/> is required to sign this document and return <u>1</u> copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) DUNS Number: 198549560 TOCOR: Megan Mehaffey Max Expire Date: 05/29/2020 LIST OF CHANGES: Reason for Modification: Other Administrative Action - MUTUAL AGREEMENT, WITHIN SCOPE, NO COST POP EXTENSION FOR UNANTICIPATED TASK 4 REVISION (see attached amended PWS) Period Of Performance End Date changed from 28-FEB-20 to 29-MAY-20 Maximum Potential Expiration Date changed to : 05/29/2020 CHANGES FOR LINE ITEM NUMBER: 1 Start Date Added : 11/29/2018 End Date Added : 05/29/2020 Continued ...							
Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				Andrea Dehne			
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA		16C. DATE SIGNED	
(Signature of person authorized to sign)				 (Signature of Contracting Officer)		ELECTRONIC SIGNATURE 01/28/2020	

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
EP-C-17-031/68HERC19F0039/P00004PAGE OF
2 2NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>CHANGES FOR DELIVERY LOCATION: CAD Delivery Date changed from 02/28/2020 to 05/29/2020</p> <p>Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711</p> <p>Period of Performance: 11/29/2018 to 05/29/2020 TOCOR: Megan Mehaffey/ (919) 541-4205/mehaffey.megan@epa.gov ALTOCOR: Patrice Borsz/ (919) 541-5233/borsz.patrice@epa.gov</p>				

**PERFORMANCE WORK
STATEMENT EP-C-17-031**

Task Order TO 19F0039

Amendment #2

Amended 1/09/2019

Title: Flood-induced Contaminants Fate and Transport and Emergency Planning with Our States
- Interactive Mapping of Flood-Induced Contaminants from Hazardous Waste Sites in EPA Regions

This amendment #2 is to: Revise Task 4 deliverables (within scope) and extend PoP.

EAS Short Title: RESES Flood and Contaminants

Task Order COR (TOCOR) Name: Megan Mehaffey Office: ORD/NERL/SED 109 TW Alexander Dr. (MC D243-05) RTP, NC 27711 Phone: 919-541-4205 Email: Mehaffey.Megan@epa.gov	Alternate Task Order COR (ATOCOR) Name: Patrice Borsz Office: ORD/NERL/SED 4930 Old Page Road (MC E211L) RTP, NC 27703 Phone: 919-541-5233 Email: Borsz.Patrice@epa.gov
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Period of Performance

Date of award through 17.5 months following award

Based period Tasks 1-5 period of performance October 15, 2018 to May 31, 2020

EPA Regional Sustainable Environmental Science Program (RESES)

Collaboration and Partnership for Sustainable and Healthy Communities

EPA's research program is a critical part of implementing the Agency's mission to protect public health and the environment. It is strategically designed to directly support our programs and regulations while also being responsive and nimble to deliver the science and technology our partners need to solve emerging, high-priority environmental and related public health needs.

The RESES program, led by EPA's Office of Research and Development (ORD), matches Agency scientific and technical expertise with high-priority, short-term research needs in each of the Agency's ten Regions across the nation. The RESES program has helped Regions respond to state, local and Tribal interests in addressing priority science issues such as waste materials management. Approaches include development of methods, use of science-based tools and multi-stakeholder engagement. RESES has also provided resources for developing innovative regional approaches that can then be used on a national scale. It has supported citizen science projects to address community concerns such as air pollution.

By design, RESES emphasizes collaboration and partnerships to deliver targeted science that can inform Agency and local decision-making. Projects are funded through an internal (EPA-only) annual solicitation for proposals.

For 2018, ORD RESES program selected the “Emergency Planning with Our States - Interactive Mapping of Flood-Induced Contaminants from Hazardous Waste Sites in EPA Regions” project to collaborate with EPA Region 2 and 3 to support EPA 2018-2022 Strategic Goals (see <https://www.epa.gov/sites/production/files/2018-02/documents/fy-2018-2022-epa-strategic-plan.pdf>) Specifically, this project results can be used to support superfund site remediation and flood-induced emergency preparedness and planning for the States.

Background

Extreme flooding has the potential to induce transport of toxic materials that are stored in the environment. In EPA Region 3, Lower Darby Creek Area (LDCA) Superfund site is vulnerable to flooding. The LDCA Site includes two landfills: (1) the Clearview Landfill and (2) the Folcroft Landfill and Annex. Operable Unit (OU) 1 includes Clearview Landfill, the Eastwick Regional Park (a/k/a “City Park” or “Park”), and a portion of the Eastwick neighborhood (a residential area) located generally east of the present-day landfill area and the Park (https://response.epa.gov/site/site_profile.aspx?site_id=5864.) OU2 consists of Folcroft Landfill and Folcroft Annex. Tidal influence affects the lower portion of Darby Creek and upstream as far as the landfill. Tidal influence generally affects Darby Creek up to the confluence of Darby and Cobb Creeks near the northern portion of the Clearview landfill, but the extent of tidal influence changes depending on extreme weather conditions. Flood plains encroach significantly onto the study area. Hurricane Floyd in 1999 caused significant flooding of Cobbs and Darby Creeks into the Eastwick neighborhood and surrounding area, inundating many homes.

These hazardous waste sites in or near floodplains could become inundated, releasing chemicals and other contaminants into flood waters or transporting contaminated sediments. However, the potential fate-and-transport of contaminants, particularly in soil/sediment, during a flood event is often poorly understood at these sites.

Purpose of this Task Order (TO)

The purpose of this TO is to provide support to EPA for producing scenario information of flood-induced temporal and spatial distributions of contaminants in sediments and surface water

from the hazardous waste sites. Two study locations are included in this TO, and they are Lower Darby Creek Area Clearview landfill Operable Unit 1 and Folcroft landfill Operable Unit 2. Tetra Tech has conducted flood studies for Superfund and hazardous sites remedial planning using HEC-RAS model. EPA selects HEC-RAS for this task order with maximizing the use of federal funding results in mind and Tetra Tech shall use the data where appropriate. EPA selects Water quality Analysis Simulation Program (WASP) model for this task order as WASP was used to deliver impacts of Gold King Mine waste release into the Animas River. Model outputs should be mapped in the form of ESRI Story Maps to display contaminant concentrations and transport across floods of varying magnitude. This TO products should prepare States’ disaster planners and responders for multiple flood return periods (10, 50, 100 and 500-year flood), and provide information for EPA superfund program managers.

The TO product should equip stakeholders and decisionmakers to preemptively address contaminants vulnerabilities, build resiliency, prepare for decontaminations, and mitigate potential human health impacts, as well as, environmental protection and restoration of priority areas. Pursuant to FAR 52.227-17, Rights in Data—Special Works, EPA shall have unlimited rights in all data, as that term is defined in the referenced clause, delivered to EPA under this task order, and in all data first produced in performance of this task order. This includes technical data, task design computer software, computer software documentation, and computer databases or other databases as those terms are defined in FAR 2.101.

Travel

Travel may be required for one person to the study locations during this work performance period. The contractor shall work with TOCOR to determine the travel purpose and expected outcomes for approval.

Tasks

Task 1: Communications and Administration

The contractor shall provide management and administrative support for the project throughout its duration. The contractor shall participate in calls with the U. S. EPA TOCOR to discuss points of contact, roles and responsibilities, Quality Assurance Project Plan (QAPP) protocols, timelines, the schedule of benchmarks, milestones and deliverables, establish dates and times for monthly calls and monthly technical progress reports and general task order administrative and technical information.

Task 2: Quality Assurance Project Plan

All work conducted under this task order shall be performed pursuant to an EPA-approved Quality Assurance Project Plan (QAPP) and its required information can be provided by EPA upon request. The QAPP shall be submitted for review and approval by the TOCOR and the EPA QA Officer (14) days after TO award. The QAPP shall be in conformance with EPA's *Requirements for Quality Assurance Project Plans* (EPA QA/R-5). Portions of this TO relevant to modeling will reference *Guidance for Quality Assurance Project Plans for Modeling* (EPA QA/G-5M), while portions of this TO relevant to geospatial data will reference *Guidance for Quality Assurance Project Plans for Geospatial Data* (EPA QA/G-5G). Elements from these sources will be used to derive base phase QAPPs for this TO.

Draft QAPP submitted to the TOCOR for review (14) days after TO award as a Microsoft Document or Adobe Portable Document Format.

Final QAPP addressing TOCOR's and QA officer's comments on the QAPP due to EPA (5) business days after receiving comments as a Microsoft Document or Adobe Portable Document Format.

Contractor shall not begin work on Tasks until receiving in writing from the EPA TOCOR that EPA has approved the QAPP.

Task 3: Hydraulic Modeling for Flood Inundation – HEC-RAS 2D Model

The contractor shall utilize EPA contracted data and information (e.g., EPA Work Assignment No. 061-RDRD-D366 of Contract No. EP-S3-07-04) and other available data to configure a HEC-RAS 2D unsteady flow model and to simulate flood inundation in the study locations across multiple flood return periods (i.e., 10, 50, 100 and 500-year flood) using design storms. The study locations are Lower Darby Creek Area OU1 and OU2 sites. First, the contractor shall

work with TOCOR to compile a final list of data sources and inputs for setting up the HEC-RAS 2-D unsteady flow model. The contractor shall deliver the final list of data sources and configuration of the HEC-RAS 2D model (2) months after final approval of QAPP. The contractor shall incorporate TOCOR comments on data sources and configuration and calibrate the model by comparing model output with observations. The contractor shall work with TOCOR to document model calibration and validation results in a Microsoft Word format. The contractor shall deliver the final model calibration results (2) months after completing final data sources and model configuration. The contractor shall run the HEC-RAS 2D model to produce time series flood inundation and water surface elevation over the flooding period. The draft model outputs shall be documented in a Microsoft Word format and delivered to TOCOR for review (2) months after the final model calibration and validation. The contractor shall work with TOCOR to deliver the final time-stepped flood inundation extents and water surface (8) months after the TO award. The final HEC-RAS 2D model results should be documented in high quality scripts, tables and figures.

Task 4: Sedimentation and Water Quality Modeling for Flood-induced Contaminants Fate and Transport – WASP Model or best suited model for flood-induced contaminants fate and transport in sediments

The contractor shall use the HEC-RAS 2D hydrodynamic outputs from Task 3 to configure the WASP model (using newest model version 8.4 with TOXI module supplied by EPA) for flood-induced contaminants fate and transport from the study locations, Lower Darby Creek Area OU1 and OU2 sites. The decision on WASP with rationale shall be included in the QAPP. The priority contaminants for this study are PAH (particularly Benzo[a]pyrene (B[a]P)), lead, arsenic, chromium, and dioxin. First, the contractor shall work with TOCOR to develop a final list of data sources in a table format and to set up the WASP model. The final list of data sources and configuration of the model shall be delivered to TOCOR (9) months after the TO award.

The contractor will evaluate the integration of the HEC-RAS-2D hydrodynamic outputs into the existing WASP model version 8.32 and make recommendations to EPA on modifications needed to the WASP model to accomplish the integration. The contractor shall document these recommendations to EPA in a memo that will allow EPA to create new WASP version 8.4 and communicate and confirm with EPA when WASP version 8.4 is fully functional and running.

When the WASP model has been reprogrammed to accept the HEC-RAS-2D model output as WASP inputs, the contractor shall use the final data sources and model configuration to calibrate the WASP model (version 8.4). The contractor shall work with TOCOR to deliver the final model calibration results in Microsoft Word format to TOCOR (2) months after the necessary revisions to the WASP model. The contractor shall run the WASP model to produce time series fate and transport of contaminant concentrations in sediments and water for the above flood return periods and over the flooding period. The draft WASP model results shall be documented with figures and tables in Microsoft Word format, and shall be delivered to TOCOR (2) months after final calibration of the model. The contractor shall work with TOCOR to deliver the final WASP time-stepped spatial distributions of PAH (particularly Benzo[a]pyrene (B[a]P)), lead, PCB (aroclor-1260) and total PCB, chromium, DDX, and dioxin concentrations in sediments and water with multiple flood return periods for LDCA OU1 and OU2 sites (17.5) months after the TO award.

Study site specific contaminants in sediment and soil data has been newly shared by the site responsible parties. Citizen science geospatial neighborhood scale data for Hurricane Irene and Floyd flooded areas and flood water depth is newly discovered for hydrodynamic model calibration and analysis. These new data **expand** on the original and are critical to further evaluate HEC-RAS and WASP model output and assess the uncertainty of model performance. As WASP will use HEC-RAS model output as an input to simulate contaminants fate and transport for Clearview, Folcroft and surrounding neighborhoods, the accuracy of the HEC-RAS model output substantively affects the WASP results. Hence the new information is **essential** to evaluate the sensitivity and validity of HEC-RAS WASP coupled modeling effort. The contractor shall incorporate the new data into the sensitivity analyses to quantify uncertainty in model predictions of priority pollutants and sediment transport.

Task 5: ESRI Story Map

The contractor shall use the outputs from Task 4 to develop an interactive ESRI Story Map that is compatible with EPA GeoPlatform environment. The map should include the HEC-RAS and WASP model outputs showing flood inundations and contaminants concentrations for 10, 50, 100 and 500-year flood return periods. The map should allow users to have the options to select any combination of individual contaminant and flood return period.

The contractor shall recommend functionality design and best practices to maximize performance. The contractor shall provide a design framework diagramming the user interface for the interactive Story Map. The contractor shall work with TOCOR to determine which, if any, socioeconomic indicators can be incorporated into the Story Map. The contractor shall work with TOCOR to design the Story Map user interface to align with existing tools currently in EnviroAtlas. The design framework shall be submitted in PowerPoint or similar format. The contractor shall work with TOCOR to deliver the final design of the Story Map (8) months after TO award.

The contractor shall present a demo and deliver a draft working prototype of the Story Map to TOCOR (7) months after the Final design framework. The contractor shall deliver data and its associated Story Map that are compatible to EPA GeoPlatform environment to TOCOR for final approval (1) month after the approval of the draft working prototype.

Finalized prototype Story Map, data and documentation used to create the Story Map incorporating TOCOR's comments on the prototype shall be delivered on an external drive and uploaded into EPA EnviroAtlas for testing. Final data, documentations, and the Story Map are due to EPA by May 31, 2020.

Deliverables and Schedule

Task No.	Deliverable	Schedule
BASE YEAR		
1	Progress Reports Other Communication	Due Monthly Due upon request by the TOCOR
2	Draft QAPP	Due 14 business days after award of Task Order

2	Final QAPP	Due 5 business days of receipt of the written comments on the draft QAPP
3	Final list of data sources and configuration of the HEC-RAS 2D model	Due 2 months after final approval of the QAPP
3	Final HEC-RAS 2D model calibration results	Due 2 months after Final data sources and model configuration
3	Draft HEC-RAS 2D model outputs	Due 2 months after Final model calibration and validation
3	Final HEC-RAS 2D time-stepped flood inundation extents and water surface	Due 8 months after TO award
4	Final list of data sources and configuration of the WASP model	Due 9 months after TO award
4	Memo of recommendations to EPA on modifications needed to the WASP model to accomplish the integration	Due by Dec. 31, 2019.
4	Final WASP model calibration results including sensitivity analysis to quantify uncertainty in model predictions	Due 2 months after availability of revised WASP model code.
4	Draft WASP model results	Due 1 month after final calibration of WASP
4	Final WASP model time-stepped spatial distributions of PAH (particularly Benzo[a]pyrene (B[a]P), lead, arsenic, chromium, PCB, dioxin concentrations in sediments and water with multiple flood return periods	Due 17 months after TO award
5	Final design framework of the Story Map	Due 8 months after TO award
5	Draft and present working prototype of the Story Map	Due 7 months after the Final design framework
5	Final data and its associated Story Map	Due 1 month after the approval of the draft WASP model results

Task	Labor	ODCs	Total
1.A. Monthly conference calls	\$2,515.82		\$2,515.82
1.B. Monthly reporting	\$1,677.21		\$1,677.21
2.A. Draft QAPP	\$5,248.05		\$5,248.05
2.B. Final QAPP	\$926.13		\$926.13
3.1.A. Initial list of data for HEC-RAS	\$5,699.33		\$5,699.33
3.1.B. Initial HEC-RAS configuration	\$11,398.66		\$11,398.66
3.1.C. Final list of data sources and HEC-RAS configuration	\$5,699.33		\$5,699.33
3.2.A. Memo describing HEC-RAS model calibration	\$19,947.66		\$19,947.66
3.2.B. Draft model outputs and documentation	\$5,699.33		\$5,699.33
3.2.C. Final HEC-RAS model output and documentation	\$8,549.00		\$8,549.00
4.1.A. Draft list of data sources for WASP model	\$6,284.50		\$6,284.50
4.1.B. Initial configuration of WASP model	\$12,568.99	\$842.50*	\$13,411.49
4.1.C. Final list of data sources and WASP configuration	\$6,284.50		\$6,284.50
4.2.0 Memo on recommendations for WASP model changes	\$40,000		\$40,000
4.2.A. Memo on final WASP calibration results	\$2,500		\$2,500
4.2.B. Draft model output and documentation	\$2,500		\$2,500
4.2.C. Final WASP model output and documentation	\$4,706.97		\$4,706.97
5.A. Draft design of ESRI Story Map	\$1,963.72		\$1,963.72
5.B. Final design	\$1,963.72		\$1,963.72
5.C. Story Map demonstration and prototype	\$10,800.48		\$10,800.48
5.D. Finalized Story Map	\$4,909.31		\$4,909.31
Total	\$161,842.72	\$842.50	\$162,685.22

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE		PAGE OF PAGES	
				1 2	
2. AMENDMENT/MODIFICATION NO. P00005		3. EFFECTIVE DATE See Block 16C		4. REQUISITION/PURCHASE REQ. NO. PR-ORD-20-01899	
5. PROJECT NO. (If applicable)		6. ISSUED BY CODE CAD		7. ADMINISTERED BY (If other than Item 6) CODE	
CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001					
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)		(x)		9A. AMENDMENT OF SOLICITATION NO.	
TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030				9B. DATED (SEE ITEM 11)	
		x		10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 68HERC19F0039	
CODE 198549560		FACILITY CODE		10B. DATED (SEE ITEM 13) 11/27/2018	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended. ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or electronic communication which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or electronic communication, provided each letter or electronic communication makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (Specify type of modification and authority) BILATERAL AGREEMENT - Order Closeout in its Entirety - All Deliverables Received and Invoices Paid

E. IMPORTANT: Contractor ☐ is not ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

DUNS Number: 198549560

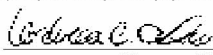
TOCOR: Megan Mehaffey Max Expire Date: 05/29/2020

LIST OF CHANGES:

Reason for Modification: FFP Order Closeout in its Entirety - All Deliverables Received and Invoices Paid

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Andrea Dehne	
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA  (Signature of Contracting Officer)	16C. DATE SIGNED 08/24/2020

Previous edition unusable

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	EP-C-17-031/68HERC19F0039/P00005	2	2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711 Period of Performance: 11/29/2018 to 05/29/2020 TOCOR: Megan Mehaffey/(919)541-4205/mehaffey.megan@epa.gov ALTOCOR: Patrice Borsz/(919)541-5233/borsz.patrice@epa.gov				